



# Tackling the Unsafe Use of Automated Dispensing Cabinets: Common Challenges and Practical Solutions

**Dr. Anas Hamad, PhD, MSc, BSPHarm, DMS, RPh**


Director of Pharmacy Department, National Center for Cancer Care & Research  
Head of Medication Safety & Quality Center, HMC Pharmacy Executive Office  
Adjunct Assistant Professor of Clinical Pharmacy & Practice, Qatar University  
Head of Standing Committee on Medication Services, Qatar Red Crescent Society

# Conflicts of Interest

Nothing to disclose



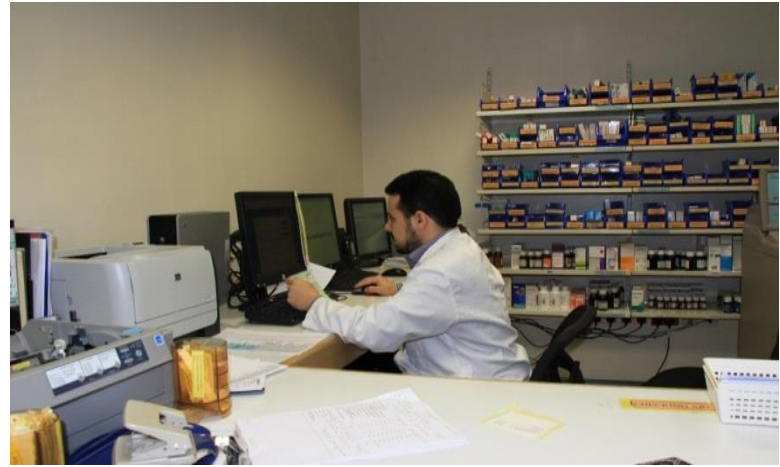
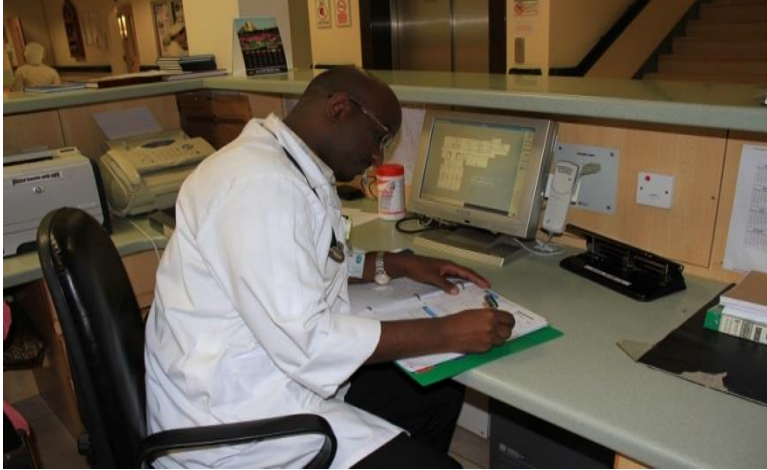
# Objectives

- **Clinical Transformation Overview.**
  - **Outline** the methodology of Assessing and Monitoring Utilization of Override Functionality.
  - **Recognize** the differences between override and critical override.
  - **Identify** the safety measures behind the best practice of reviewing override transactions on daily basis.
  - **Display** the results of periodic review of the override list of medications, daily review of override transactions by pharmacy staff.
  - **Data Monitoring & Analysis.**
- 

# Medication Carts



# Paper Based System



# Medication Delivery



# Past vs Present Ordering

## Paper Prescription

Outpatient and  Discharge Prescription (Patient File)

**Patient ID**

Clinic No. \_\_\_\_\_ Location \_\_\_\_\_

Allergy  NKA  Yes \_\_\_\_\_

Diagnosis *CS 67098*

Weight (kg) *83.6* Height (cm) *165.3* BSA (m<sup>2</sup>) *1.75*

Tick if yes  Pregnant  Breastfeeding

Nationality \_\_\_\_\_ Date of Birth [D][D]/[M][M]/[Y][Y][Y][Y] Age in years \_\_\_\_\_ Gender M/F

	Medications: Approved generic name/Dosage form/ Strength	Dose	Route	Frequency	Other e.g. Duration
1	<i>Epinephrine</i>	<i>100mg / m<sup>2</sup></i>	<i>= 190 mg</i>	<i>IV</i>	
2	<i>Cyclophosphamide</i>	<i>500mg / m<sup>2</sup></i>	<i>= 950mg</i>	<i>IV</i>	<i>over 30 min</i>
3	<i>5-Fluorouracil</i>	<i>500mg / m<sup>2</sup></i>	<i>= 950mg</i>	<i>IV</i>	<i>over 30 min</i>
4					
5					

Counter physician Signature and stamp \_\_\_\_\_ Physician signature and stamp \_\_\_\_\_ Date *8/10/17* Time *9:10 AM*

Initial \_\_\_\_\_ Reviewed by \_\_\_\_\_ Checked by \_\_\_\_\_

Pharmacist  Pharmacy Tech  Pharmacist  Other  Pharmacist  Other

9600001783 11-0566 B/Forms

## CPOE

Task Edit View Options Help

MRN: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: Male Location: Out Day Care / Day Care Rec Chair B2  
 Race: Non National Addressed: 15/10/2017 09:03 AST  
 Language: English

Enter a patient MRN: \_\_\_\_\_

Acute Profile Ambulatory Profile Results Interventions Unverified Orders Monitor

Demographics

Action	Status	Order Sentence	Start	Stop	Order Type
Epinephrine 10 mg / 0.47 mL Subcutaneous Once	Discontinued		21/09/2017 08:03 AST	21/09/2017 08:03 AST (p)	MED
Fluorouracil 1 g/m <sup>2</sup> 130.1 mL IV Once 400 mL/2h	Discontinued		21/09/2017 08:03 AST	21/09/2017 08:19 AST (p)	INT
Mofetil 250 mg / 5 mL Intraosseous Once	Discontinued		21/09/2017 08:15 AST	21/09/2017 10:24 AST (p)	MED
bleomycin 2 units(1) / 0.4 mL Intravenous Once 6 mL/1h Day 1	Discontinued		28/09/2017 17:09 AST	28/09/2017 11:41 AST (p)	PROTOCOL
doxorubicin + sodium chloride 0.9% IV INT Inf Once Chemo ...	Discontinued		28/09/2017 17:19 AST	15/10/2017 11:20 AST (p)	PROTOCOL
granisetron + sodium chloride 0.9% IV INT Inf Once Chemo 2...	Discontinued		28/09/2017 17:19 AST	15/10/2017 11:31 AST (p)	PROTOCOL
azoprost 125 mg / 1 cap(1) Oral Once Chemo Day 1, 15	Discontinued		28/09/2017 17:19 AST	15/10/2017 11:33 AST (p)	PROTOCOL
DOXORUBIN + sodium chloride 0.9% IV INT Inf Once Chemo ...	Discontinued		28/09/2017 17:49 AST	15/10/2017 11:45 AST (p)	PROTOCOL
voriconazole + sodium chloride 0.9% IV INT Inf Once Chemo ...	Discontinued		28/09/2017 18:04 AST	15/10/2017 11:56 AST (p)	PROTOCOL
dacarbazine + sodium chloride 0.9% IV INT Inf Once Chemo ...	Discontinued		28/09/2017 18:19 AST	15/10/2017 12:04 AST (p)	PROTOCOL
hydrocortisone + sodium chloride 0.9% IV INT Inf Once Chemo ...	Discontinued		28/09/2017 19:19 AST	15/10/2017 12:12 AST (p)	PROTOCOL
bleomycin + sodium chloride 0.9% IV INT Inf Once Chemo 20...	Discontinued		28/09/2017 19:34 AST	15/10/2017 12:21 AST (p)	PROTOCOL

Patient Note(s)

Allergies (1)

Medications

Problems and Diagnoses (7)

Problems (1)

Interventions (7)

Submit Cancel Apply

Inactive View: Day Care JMC027986 PROD | 13:05



# Past vs Present Distribution

## Medication Cart



## Automated Dispensing Cabinet

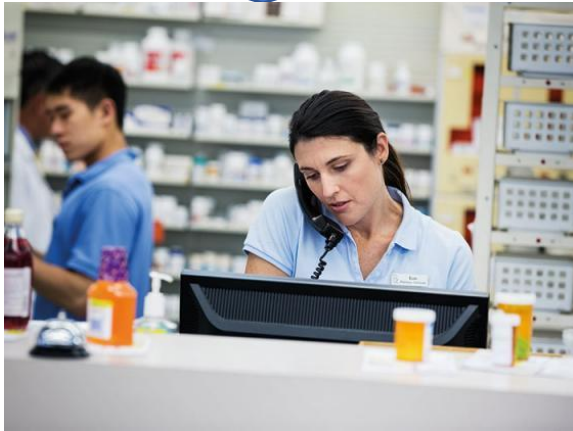




Physician Prescribe



Pharmacist Verify



Nurse Remove



# Automated Dispensing Cabinets

- ❑ Automated Dispensing Cabinet (ADC) is a computerized medication distribution system that improves accuracy, increases efficiency and enhances patient safety.
- ❑ The system is interfaced with the pharmacy system and allows nurses to access medications only after the order has been reviewed for appropriateness by a pharmacist.



# ADC Benefits



# On the Other Side!



[Articles & Issues](#) ▾ [Collections](#) ▾ [Multimedia](#) ▾ [CE/NCPD](#) [For Authors](#) ▾ [Journal Info](#) ▾

## VIEWPOINT



Images

## Automated Dispensing Cabinets Curse or Cure?

Stachowiak, Mary Elizabeth MSN, RN, CNL

[Author Information](#) ☺



Download

AJN, American Journal of Nursing: May 2013 - Volume 113 - Issue 5 - p 11  
doi: 10.1097/01.NAJ.0000430215.97411.8f



Cite

FREE



Metrics

Ac  
Go

# Highlight


**As any technology introduced to healthcare setting had its risk and benefits, we need to monitor all aspects of ADC functionalities.**

**Override**



# Override Function


The system offers an “override” functionality where the medication can be withdrawn from ADC against a placed order on the system, but without pharmacy verification. To enhance the safety of this function, two things should be done:

- **a multidisciplinary team** should discuss and agree on a **list of medications** to be accessed by override and on the acceptable reasons for using this function.
  - Pharmacy staff shall **review override transactions** on daily basis to ensure the availability of medication orders, review the appropriateness of override reason, and discuss discrepancies with the Unit Head Nurse.
- 



# Override Function

If a medication stored in a restricted ADC is needed, but there is no active order on the patient profile, permission to override may be allowed, although this practice is discouraged.





# Regular Override vs Critical Override


## Critical Override:

This function is only available during downtime. It allows nurses to withdraw any medication from ADC before the order is placed into the clinical information system.






## Override Function (Cont.)

- Role of Pharmacy and Therapeutics Committee.
  - Hospital policy.
  - Workflow design.
- 



# Examples of Medication Override List

- Hydrocortisone vial
  - Diphenhydramine vial
  - Furosemide ampoule
  - Lidocaine 2% 50 ml vial
  - Heparin 1000 units/ml vial
  - Etomidate ampoule
  - Propofol ampoule
  - Glyceryl trinitrate S/L tablets
  - Fractionated plasma protein
  - Paracetamol 1 gm IV
  - Salbutamol nebulizer
  - Injectable Narcotics.
- 

# ISMP Guidance on Proper ADC Use (2009)

## Core Element #9 Establish Criteria for ADC System Overrides

*Rationale: Use of ADC overrides should be situationally dependent, and not based merely on a medication or a list of medications. While there may be a list of drugs with the potential to be obtained emergently, there may be many other situations when there is sufficient time for the pharmacist to review the medication prior to retrieving the dose. Criteria for system overrides should be established that allow emergency access in circumstances in which waiting for a pharmacist to review the order before accessing the medication could adversely impact the patient's condition.*

### Guidelines:

- Ensure medications available for override are unit specific and removed only when there is emergent need.
- Implement strategies that reduce the risk of error when an override is used, including: Limiting the quantity and number of drug concentrations available.

# ISMP Guidance on Proper ADC Use (2019)

## Core Safety Process # 3

### Provide Profiled ADCs and Monitor System Overrides

*The use of an ADC in a “**PROFILED** mode” is considered an important safety feature throughout the healthcare industry as it directs **PRACTITIONERS** to a patient-specific medication profile and limits access to only medications that have been reviewed and verified by a pharmacist as appropriate for the patient. Use of a non-**PROFILED** ADC (which is not recommended), allows **PRACTITIONER** access to all medications contained within the cabinet, typically bypassing the pharmacist’s review of the order prior to medication selection.<sup>21-23</sup>*

*An ADC **OVERRIDE** occurs when a **PRACTITIONER** bypasses the pharmacist’s review of a medication order to obtain a drug from the ADC when an assessment of the patient indicates that a delay in therapy (to wait for*

© 2019 Institute for Safe Medication Practices | Guidelines for the Safe Use of Automated Dispensing Cabinets

*a pharmacist’s review of the order) would harm the patient. The use of ADC **OVERRIDES** should be situation dependent and justifiable, and not based merely on a list of medications. While there may be a list of drugs with the potential to be obtained emergently, there may be some situations when there is sufficient time for the pharmacist to review emergent medications prior to retrieving the dose.*

**NEW BEST PRACTICE 16:**

- Limit the variety of medications that can be removed from an automated dispensing cabinet (ADC) using the **override** function.
- Require a medication order (e.g., electronic, written, telephone, verbal) prior to removing any medication from an ADC, including those removed using the override function.
- Monitor ADC overrides to verify appropriateness, transcription of orders, and documentation of administration.
- Periodically review for appropriateness the list of medications available using the override function.
  - Restrict medications available using override to those that would be needed emergently (as defined by the organization) such as antidotes, rescue and reversal agents, life-sustaining drugs, and comfort measure medications such as those used to manage acute pain or intractable nausea and vomiting.*

**Rationale:**

The goal of this Best Practice is to minimize risks associated with the removal of medications from an automated dispensing cabinet using the “override” feature. One of the biggest challenges to the safe use of automated dispensing cabinets is the ease with which medications can be removed upon override, many times unnecessarily and with a lack of perceived risk. Practitioners often view the override process as a routine, rather than a risky step, and fail to recognize that use of the feature should be situation dependent and justifiable, and not based merely on an approved list of medications that can be obtained via override. Removing medications using the override feature should be limited to emergent circumstances when waiting for a pharmacist to review an order could adversely impact the patient’s condition, and approved overridable medications should be limited to those that fit this intended use.\*

Sometimes, practitioners will obtain a medication from a dispensing cabinet without a specific verbal, telephone, written, or electronic order. This may be incorrectly referred to as an “override;” however, all true overrides should begin with an order (or protocol) and end with a decision not to wait for a pharmacist review before obtaining the medication from the cabinet.

**Best Practice 16**

**First Introduced:**  
2020-2021

**Related ISMP Medication Safety Alerts!:**


**October 24, 2019; February 14, 2019; January 17, 2019; December 19, 2019;** August 1, 2019; June 20, 2019; March 14, 2019; February 28, 2019; February 22, 2018; January 11, 2018; June 2, 2016; January 13, 2011; March 10, 2011; September 9, 2010; November 19, 2009; January 17, 2008; May 31, 2007; February 22, 2007.

**See also:** *ISMP Guidelines for the Safe Use of Automated Dispensing Cabinets (2019).*

# New ISMP Best Practice (2020)



# Our Experience with Tackling Overrides at NCCCR/HMC in Qatar

- In April 2015, we started a quality improvement project to evaluate the override functionality in the National Center for Cancer Care and Research (NCCCR).
  - The primary objective of this project was to optimize the frequency of overrides and the appropriateness of reasons for override.
  - We worked on the numbers in the beginning, decreasing the number was our target until Dec 2016.
- 




# Review Process

- On daily basis, we were checking all the overrides made against physician order availability.
- Appropriateness of the override reasons was also evaluated.






# Methods

- Data on the frequency of overrides and appropriateness of reasons were collected from the system-generated override reports on daily basis and documented in an excel sheet.
  - Data were analyzed on a monthly basis to identify any trends in the frequency of overrides and appropriateness of override reasons.
  - In order to ensure patient safety, the availability of physician orders were checked in the pharmacy system on daily basis.
  - Any discrepancies identified were communicated through e-mail with head nurses and written justifications were requested.
- 




# Findings

- Medication override is not without risk.
  - Some orders were taken by override without mentioning a reason at all or mentioned an invalid reason.
  - Lack of physician orders that were documented on patient records after override.
- 




# Findings

- Although medication order was already on the pharmacy profile (therefore reviewed by a pharmacist), a nurse removed it via override.
  - Some Medication errors related to override like wrong patient or wrong medication.
- 




# Actions Taken

- Reviewed the type and frequency of medications removed using the override function.
  - Determine if there are drug classes with safety concerns (e.g., opioids, electrolytes) to focus on when planning for override medication list changes.
  - OVA (incident) reports were initiated when needed.
- 



# Data Analysis

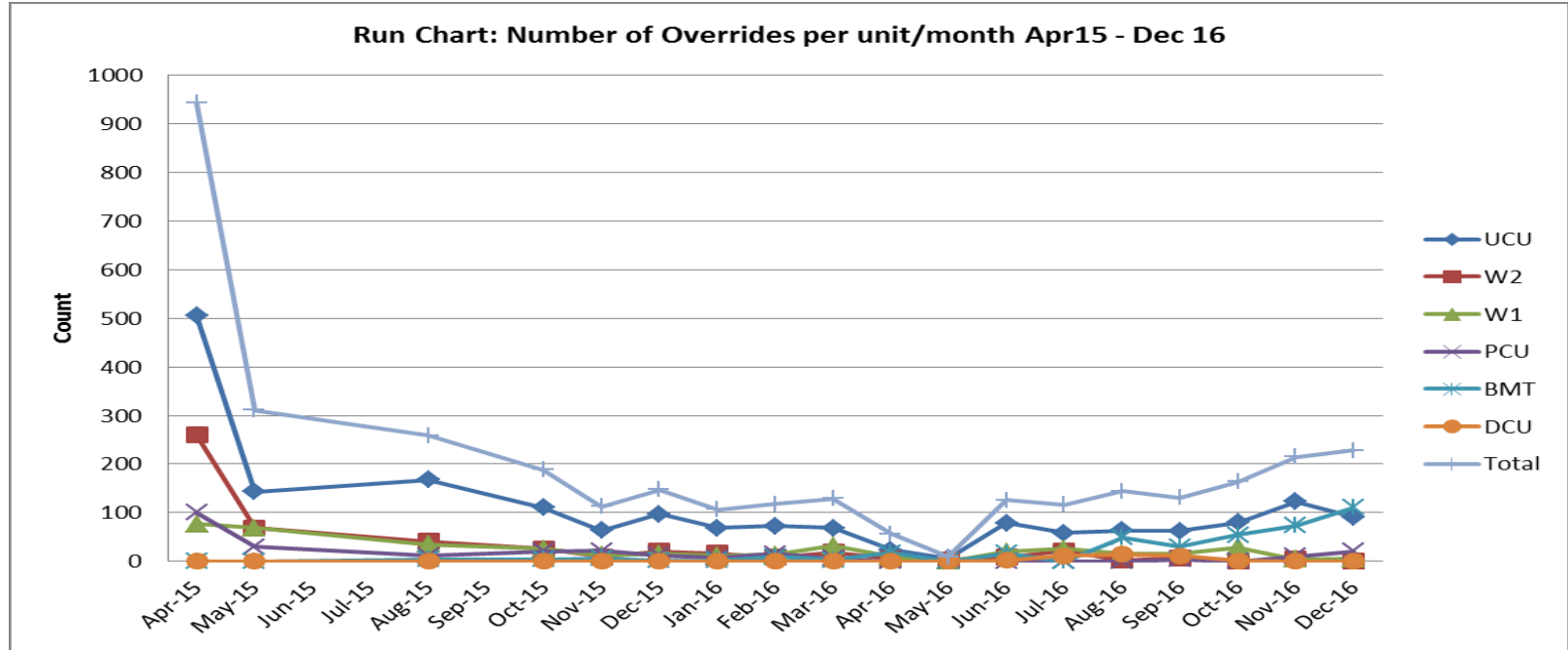
- Data were analyzed on a monthly basis to evaluate:
    1. Frequency of overrides.
    2. Appropriateness of override reasons.
    3. Compliance of adding medication orders to the system.
- 

# Results

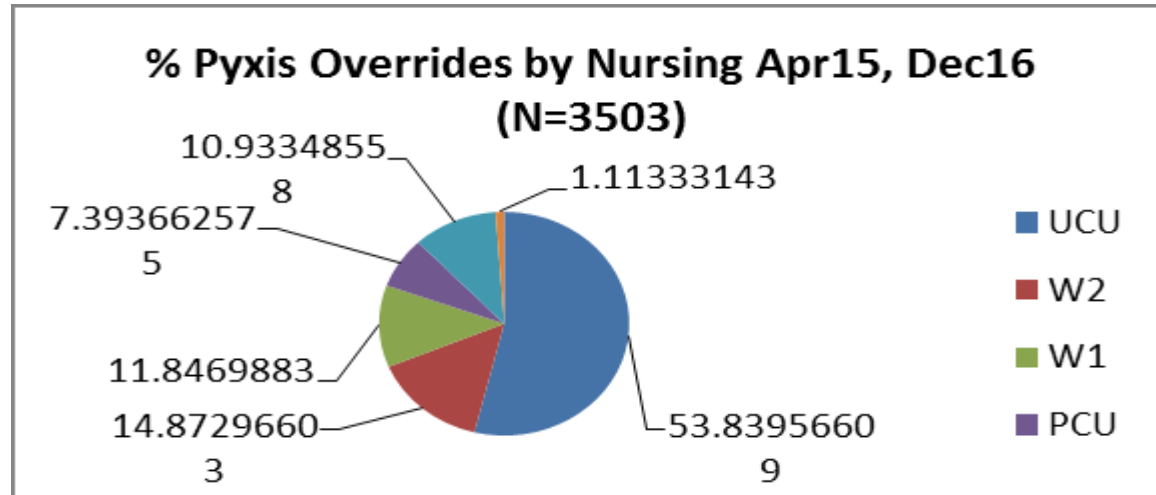




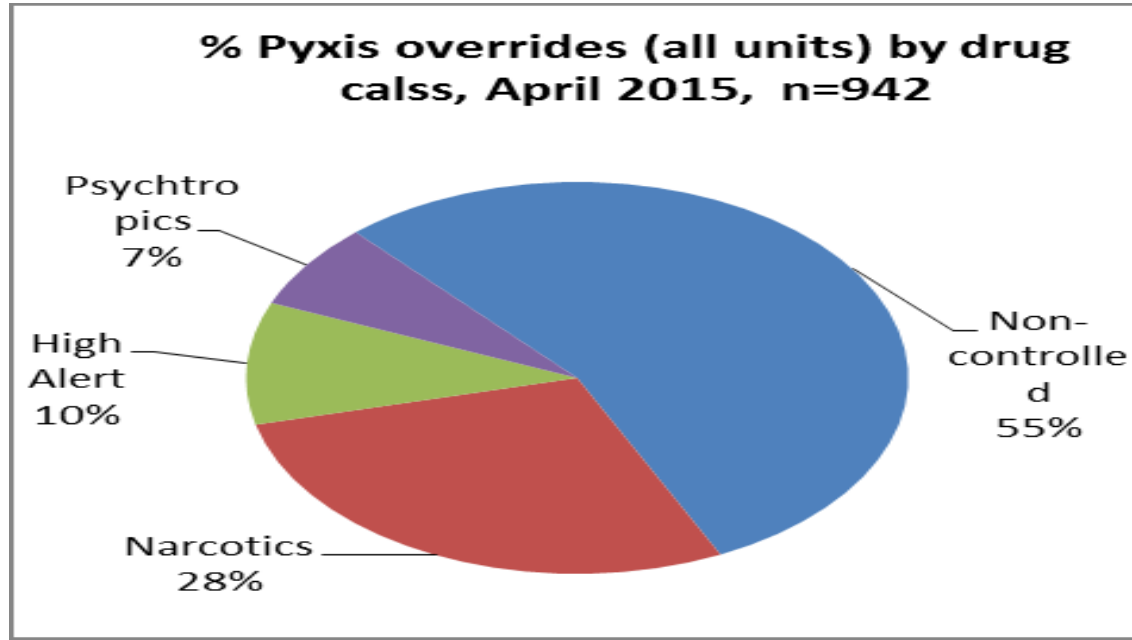
# Number of Overrides



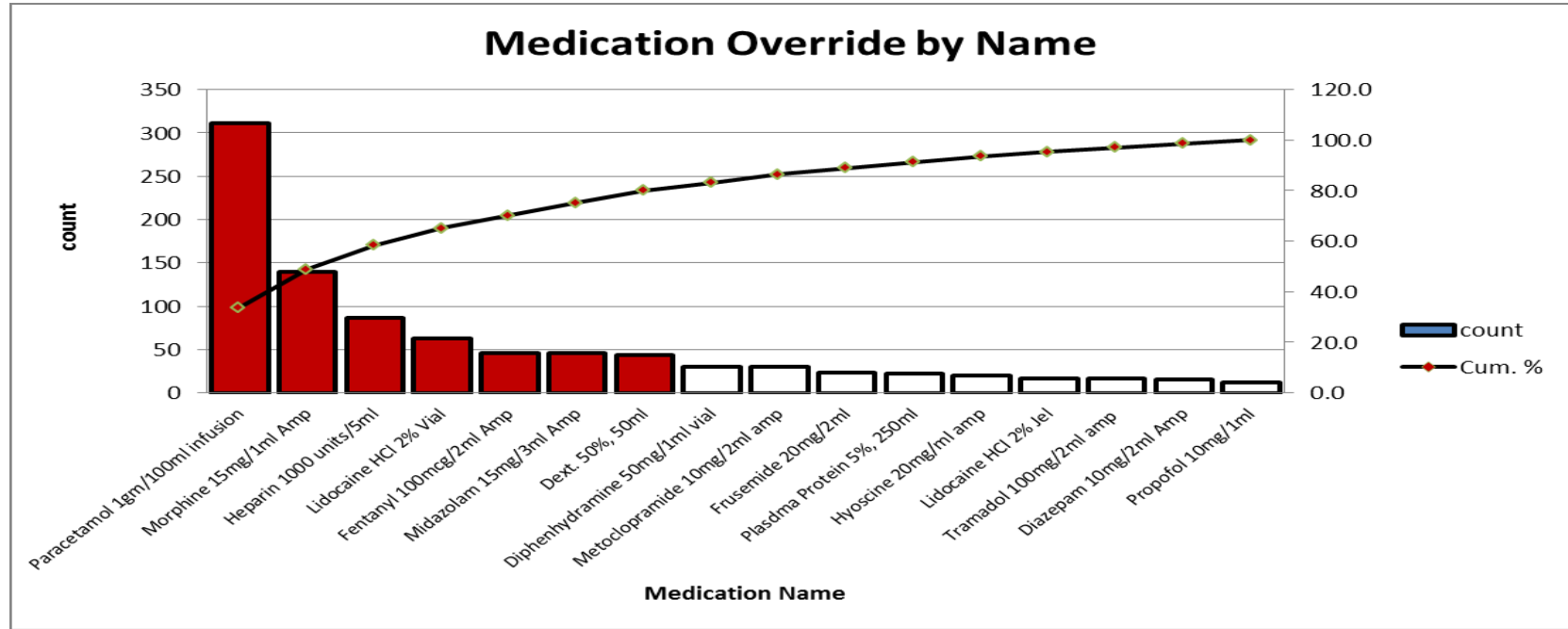
# Percentage by Units



# Percentage by Drug Class




# Medications by Name






# Discussion

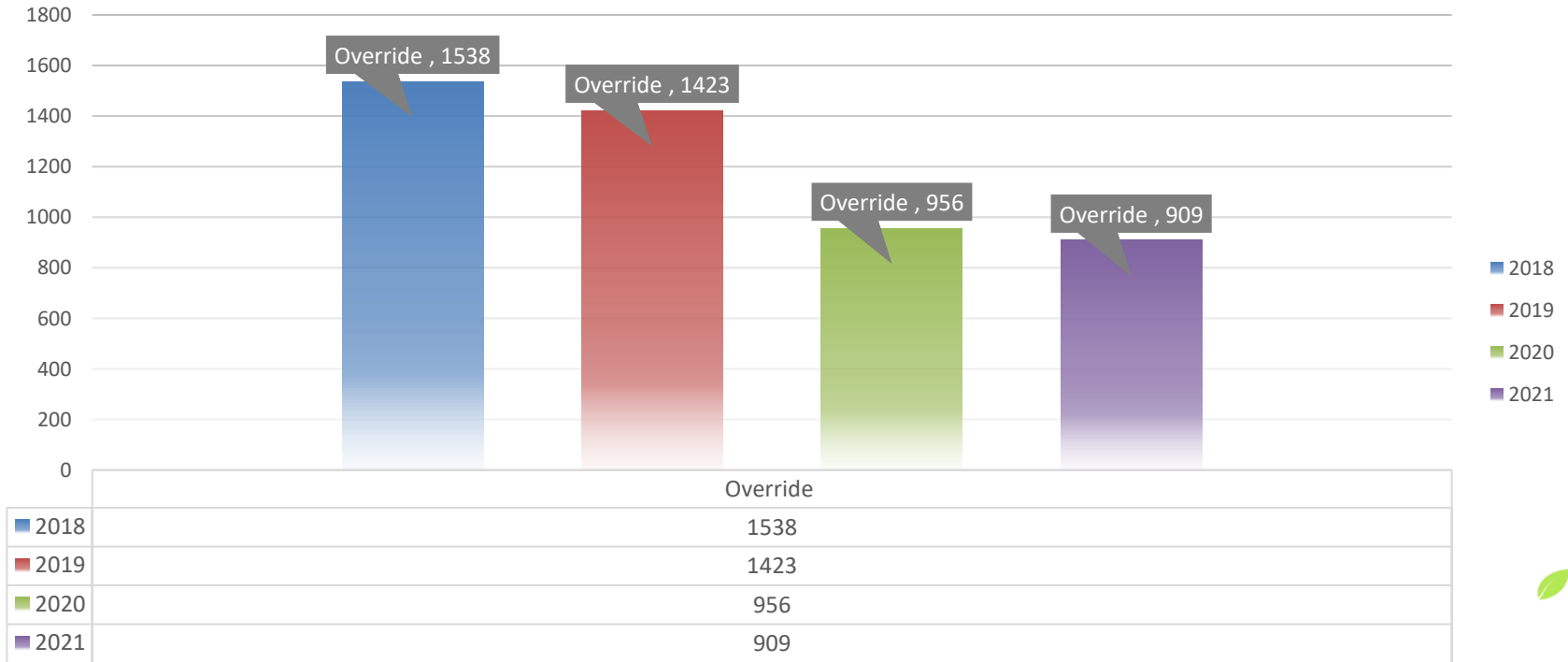
- ❑ The overall frequency of overrides decreased by 87% from 942 transactions in April 2015 to 129 in March 2016.
  - ❑ From March 2016 - Dec 2016 we kept the same level, although we had two system upgrades.
- 



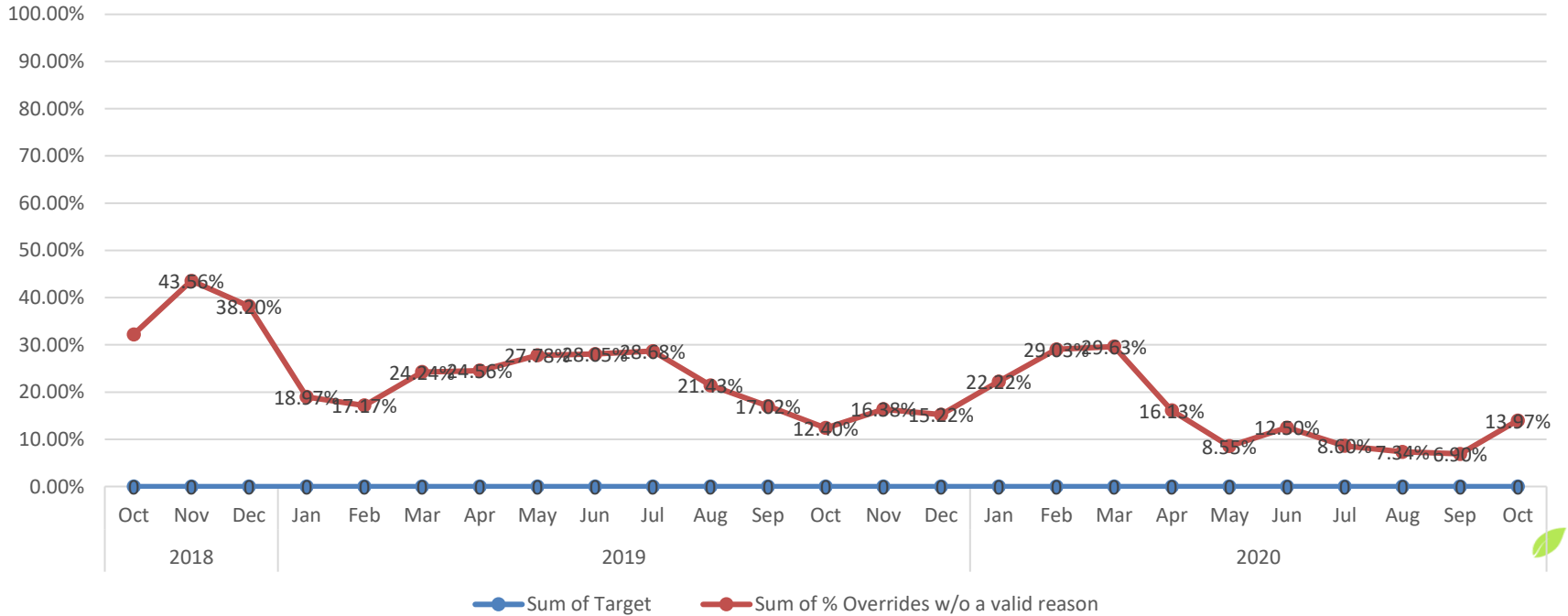
# Recommendations

- Periodic review of the hospital override medications list.
  - Mandating the documentation of override reasons.
  - Daily review of override transactions by a pharmacist or pharmacy technician.
- 

# Where We Are Today




# Proportion of ADC Unjustified Overrides







# Acknowledgement

- Dr. Elham Al-Sagga  
Unit-Dose Pharmacy Supervisor
  
  - Dr. Amir Nounou  
Pharmacy Informatics Officer
- 

# References

- ❑ 1-Institute for Safe Medication Practices (ISMP) Guidance on the Interdisciplinary Safe Use of Automated Dispensing Cabinets.
- ❑ 2-ASHP guidelines on the safe use of automated medication storage and distribution devices. American Society of Health-System Pharmacists. Am J Health Syst Pharm 55:1403–1407, Jul. 1, 1998.
- ❑ 3-Assessing and monitoring override medications in automated dispensing devices Available from: Susan J Skledhttps.

Thank You

